IN THE SPECIFICATION

Page 14

Please replace the paragraph beginning at line 26 with the following rewritten paragraph:

--A method in accordance with a preferred embodiment of the present invention includes a process which shall be referred to as Digital moiré subtraction (DMS). The interferometer is configured with a means of introducing carrier, or tilt fringes in the interferogram, with the number of fringes across the field variable, but within the resolution of the image camera and frame store. This can usually be accomplished by manual adjustment of a mirror. The image is captured, digitally stored and used as a reference. Subsequently the reference image is then subtracted from the acquired images and the difference displayed.--

Page 16

Please replace the paragraph beginning at line 24, ending on page 17, line 15, with the following rewritten paragraph:

--Illumination is provided by a He-Ne laser, 9 fitted with a diverging objective at a distance approximating to the focal length of the interferometer collimating lens (L1). The second lens, at the exit of the system acts as a field lens for the CCD camera 2 used to capture and record the interferograms. The apparatus is arranged such that the patterns of the interference fringes produced by the interferometer 1 are focused onto the CCD sensing element 21 of the camera. The camera outputs a continuous stream of captured digital images I(t) and an image store 3 is arranged to record an image

captured at a selected time. The apparatus includes an image recorder arranged to record the sequence of captured images, which can also play the images back to the image processor 4. The image processor 4 combines the stored image $I(t_1)$ with the live image or image retrieved from the recorder 7 to produce a further image FI including a moiré fringe pattern. The further images are displayed on a display 5 in real time (at video rate) and/or may be recorded by the, or another, recorder 6. Briefly, the mechanism for generating interference fringes is by interference between the two reflected beams from M1 and M2, which are added by BS. Any perturbation of one beam resulting from the insertion of an optical component, or refractive index variation caused, for example, by convective flow, will disturb the wavefront of this beam and produce interference fringes.--

Page 17

Please replace the paragraph beginning at line 27 with the following rewritten paragraph:

--A tilt was applied to one mirror in order to produce an even finer pattern, largely free from broadly spaced fringes. In a method embodying the present invention, this image is captured and then digitally subtracted from the live image. The optical errors in the interferometer are thus removed making it sensitive only to the errors of the introduced test component. As a test, by introducing an additional small tilt (i.e. a tilt in addition to the tilt applied to produce the even finer pattern) to one mirror the subtracted moiré interferogram of Figure 2(b) was produced. Such straight and uniformly spaced

moiré fringes 12 are normally expected only from an interferometer possessing a high degree of optical correction.--

Page 21

Please replace the paragraph beginning on line 27 and ending on page 22, line 9, with the following *three* paragraphs:

--In testing components that are subject to high levels of strain, hundreds of interference fringes may be generated and whose orientations vary greatly. This will present problems in applying successfully automatic fringe analysis by the traditional approach. With DMS, the test interferogram of the high strain condition can be stored as a new reference, i.e. a "snapshot" of the interference fringe pattern can be taken at a particular moment in time, for use as a reference image. The interferometer is then reset to a null fringe condition, so that subsequent changes in the level of strain will appear as individual moiré fringes, rather than a subtle variation to a complex pattern. This process has important implications in the enhanced detection of special events in testing, such as the initiation of cracking and the onset of plastic deformation.

A feature of moiré techniques applied to in-plane displacement measurement is a method for displaying in-plane strain contours by shearing the image upon itself. In moiré interferometry this could be applied by performing a subtraction between two sheared interferograms, both at the same high strain state. The shear can be introduced digitally and with little delay, so that the potential for displaying strain contours in effectively real time is possible. Figure 9 is an example of an x-strain contour map of an aluminium test specimen containing a crack. The contours show interference fringes 11

and moiré fringes 11, as discussed above. The strain intervals are approximately 0.05% strain.

In testing components which bear an imperfect surface pattern, due to errors in pitch or local orientation, the imperfections can be eliminated along with the other optical aberrations.--

Page 23

Please replace the paragraph beginning at line 10 with the following rewritten paragraph:

--Apart from the facility for ameliorating the effects of gross aberrations of the optical components, another advantageous feature of digital moiré subtracting is its potential in large aperture interferometry. In a preliminary study, an interferometer based on the Fizeau design was constructed from simple components.--

Please replace the paragraph beginning at line 17 with the following rewritten paragraph:

--Figure 5 indicates that two nominally flat and parallel glass sheets (P1, P2) and a collimating lens can be used to demonstrate the principle of the approach. Interference takes place between the wavefronts reflected from the rear surface of P1 and the front surface of P2. The combined wavefronts are re-focused by the collimating lens and directed towards the CCD camera 2 via the beam-splitting glass plate P3. All the components are uncoated; hence the intensity of the emergent captured light is low, restricted by the combined reflections of approximately 4% at each interface of P1, P2